March 22, 2006

EX PARTE: VIA ELECTRONIC SUBMISSION

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

RE: In the Matter of the Review of the Emergency Alert System (EB 04-296);
In the Matter of E911 Requirements for IP-enabled Services (WC 05-196)

Dear Ms. Dortch:

On March 9th, 2006, Jon Metzler of Rosum Corporation, and James Green of Mercury Strategies, LLC, met with Jeffrey Goldthorp, John Healy and Walter Johnston of the FCC Office of Engineering and Technology; and Jennifer Schneider and Tim Stelzig, Attorneys in the Competition Policy Division of the Wireline Competition Bureau. The purpose of the meeting was to discuss applications of broadcast television spectrum in support of homeland security. The potential implications of Rosum's broadcast signal-based positioning technology on these applications and its applicability towards E9-1-1 call location were also discussed.

Thank you for your attention. Should you have any questions, please do not hesitate to contact me. Materials left with those present are appended to this filing.

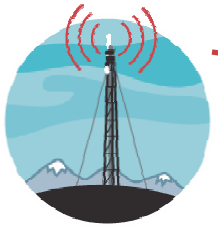
Sincerely yours,

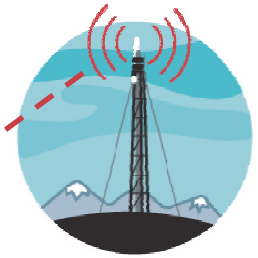
Jon Metzler
Business Development Director
Rosum Corporation

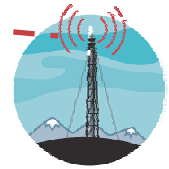
Cc: Jeffrey Goldthorp
John Healy
Walter Johnston
Jennifer Schneider
Tim Stelzig
James Green

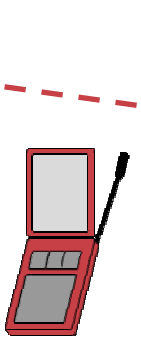
How TV-based Positioning Works

4500 CONUS analog and digital channels are already built and operational. Broadcasts contain synchronization pulses usable to measure timing.





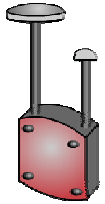




1) Rosum-enabled device receives TV signals, and computes their timing. Picture is not demodulated.

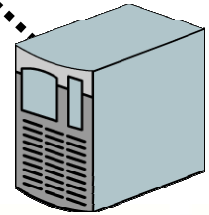
5) Results sent back to device or to remote tracking application

2) Device passes information to Location Server



Regional Monitor Unit covers 50-100km radius; sees same signals as mobile device

3) Aiding data for position calculation



4) Location Server computes position

Department Of Homeland Security Launches Digital Emergency Alert System Pilot For The National Capital Region

Alert and Warning Systems to Be Enhanced by High-Speed Wireless Digital Broadcasts

Release Date: October 21, 2004
Release Number: HQ-04-233

Washington, D.C. -- The Department of Homeland Security's Federal Emergency Management Agency (FEMA) announced today the launch of the Digital Emergency Alert System (DEAS) pilot in the National Capital Region. This six-month pilot will demonstrate how Homeland Security can improve public alert and warning during times of national crisis through the use of local public television's digital television broadcasts.

FEMA's Office of National Security Coordination serves as the federal government's executive agent for the national-level Emergency Alert System (EAS). The pilot program is a joint venture among FEMA, Homeland Security's Information Analysis and Infrastructure Protection directorate, and the Association of Public Television Stations.

Michael D. Brown, Under Secretary for Homeland Security Emergency Preparedness and Response said, "This technology will substantially improve Homeland Security's ability to provide alert and warning accessibility to the hearing and sight impaired, targeted warning messages, and improved public reception by increasing the types of devices that can receive critical alert and all hazards warnings."

Working with cellular telephone service providers, television and radio broadcasters, hardware and software developers, community leaders and emergency managers, Homeland Security will use this pilot to identify best practices and develop a foundation for deploying DEAS nationally. This system will also supplement and integrate with the existing national EAS.

Reynold N. Hoover, Director of the Office of National Security Coordination said, "With today's signing, we begin the process of testing and developing the ability to provide a digital backbone that can improve the effectiveness and efficiency of the Emergency Alert System."

On March 1, 2003, FEMA became part of the U.S. Department of Homeland Security. FEMA's continuing mission within the new department is to lead the effort to prepare the nation for all hazards and effectively manage federal response and recovery efforts following any national incident. FEMA also initiates proactive mitigation activities, trains first responders, and manages the National Flood Insurance Program and the U.S. Fire Administration.

Last Updated: Thursday, 21-Oct-2004 11:43:01

Return to the article

ROSUM

TV Spectrum & Homeland Security

March 2006

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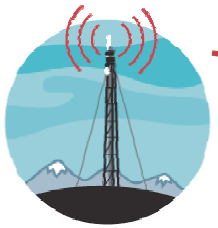

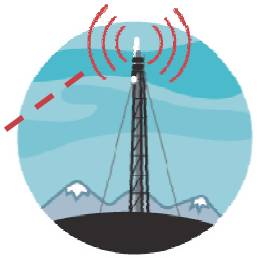

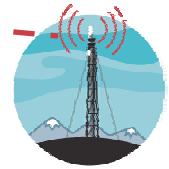

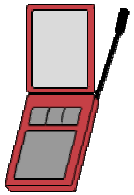

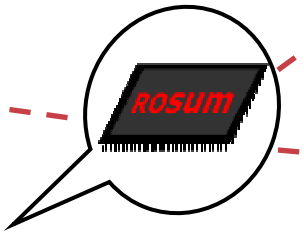

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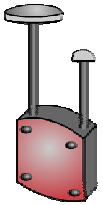

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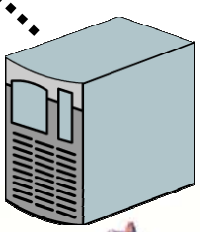

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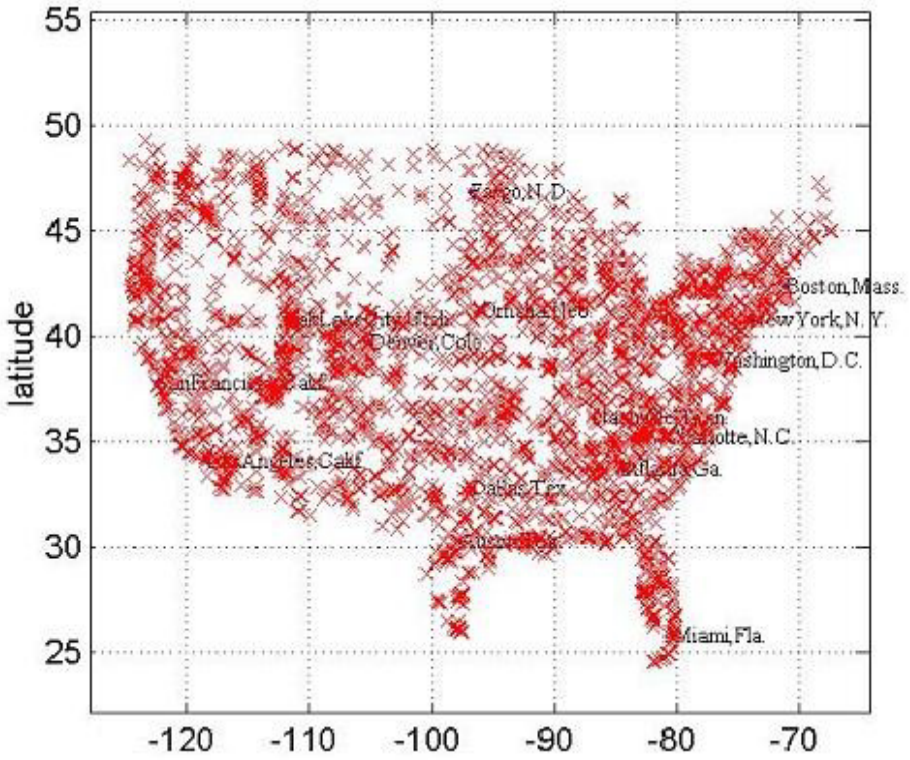
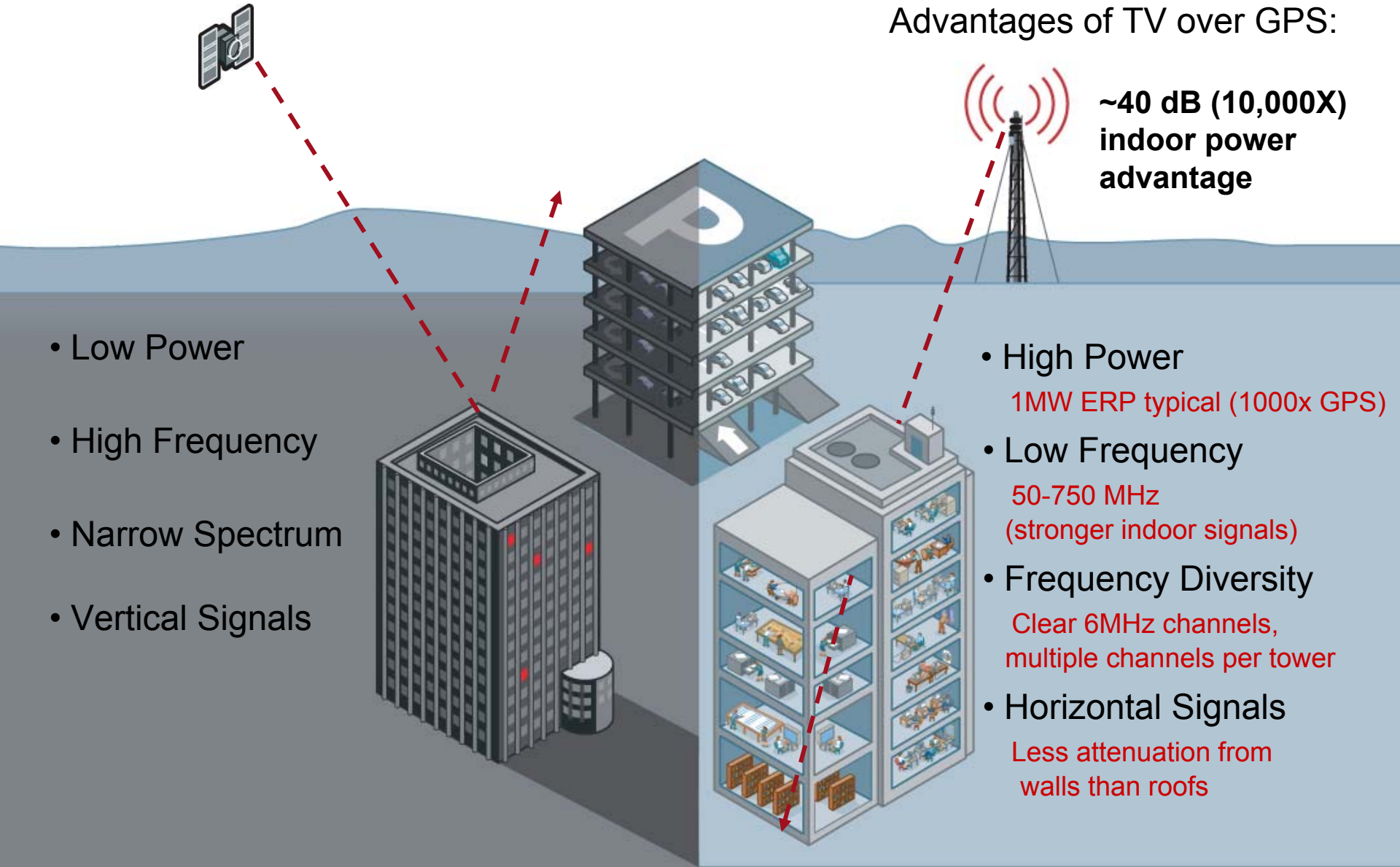
Terrestrial TV is correlated with population density



CONUS TV transmitter infrastructure

TV transmitters of the Northeast Seaboard

Broadcast TV as Compared to GPS



- Low Power
- High Frequency
- Narrow Spectrum
- Vertical Signals

Advantages of TV over GPS:

~40 dB (10,000X) indoor power advantage

- High Power
  - 1MW ERP typical (1000x GPS)
- Low Frequency
  - 50-750 MHz (stronger indoor signals)
- Frequency Diversity
  - Clear 6MHz channels, multiple channels per tower
- Horizontal Signals
  - Less attenuation from walls than roofs

TV Spectrum Bands Today & Tomorrow

Band	**Frequency**
Low VHF	50-86 MHz
High VHF	170-212 MHz
UHF	450-750 MHz
GPS	1.575 GHz
L-band (planned for TV broadcasts to mobile handsets)	1.675 GHz

Homeland Security Applications of TV

- Used now for Emergency Alert System (>95% population reach)
- MSRC guidelines in place
- FEMA / APTS DEAS Pilot
- Usable now for position location
- Other potential applications:
  - Reverse E9-1-1
  - Clock

Purpose-Deployed Beacons (PTTs)

- Rosum has developed prototype beacons or PTTs (pseudo TV transmitters) that create a high-accuracy positioning zone around assets of interest

- Signals are optimized for positioning
- Could also be used for clock

Augmenting TV Signals

- Transmitter clocks can be stabilized through GPS receivers or Rubidium clocks
- Inexpensive when compared to annual upkeep for the GPS satellite constellation
- Highly complementary to GPS
- The result would be an enhanced Emergency Alert System with positioning and clock capability
- No impact on broadcast itself

Introduction

The Global Positioning System (GPS) comprises 28 satellites and is used worldwide for positioning and navigation of mobile assets. It is also used to deliver precise clock information to time-sensitive applications or assets. The GPS is dual-use and has spawned a host of commercial applications ranging from location-aware cellular phones, to fleet management services for enterprises, to handheld navigation devices for consumers. The global fleet management market alone, which uses GPS location data to support tailored applications such as route optimization, is predicted to grow to nearly $6 billion by 2007. Meanwhile, CDMA cellular operators such as Verizon and Sprint Nextel rely on GPS to synchronize their cellular networks, and financial services use GPS to synchronize encrypted networks.

Our GPS Dependency

The growth in GPS-based applications has resulted in increased dependencies that can be exploited through GPS denial, leading to service disruption, competitive disadvantage and potential loss of life. Manuals for GPS jammers are now freely available on the Internet, while jammers themselves are inexpensive to build. Against this backdrop, on December 8, 2004, the Bush Administration issued a Presidential Decision Directive [1] designating the GPS as critical national infrastructure and mandating the creation of an executive committee to examine terrestrial alternatives to complement and augment the GPS.

DARPA, the Office of Naval Research (ONR), and the Space and Naval Warfare Systems Center (SPAWAR), among others, have solicited proposals to address this need. DARPA has described our dependency on the GPS as an "asymmetric threat"[2] – disruption of its availability would impede us more than it would impede our enemies.

Even during times of normal operation, GPS performance is limited in key indoor and urban environments, where most assets of value, human and material, reside. In the homeland, it is precisely urban centers that are that are believed most at risk of terrorist attack. In OCONUS environments, US warfighters may be confronted by enemies relying on urban warfare tactics that necessitate building-by-building offensives, where GPS reception may be impaired.

The GPS is mature, established, iteratively improving and effective in a broad number of scenarios. However, for the reasons cited above, complementary, robust positioning alternatives that are effective indoors and in urban environments are desired.

TV-Positioning

TV-positioning is one such alternative. Rosum Corporation, headquartered in Mountain View, California, in Silicon Valley, has developed a positioning technology that utilizes unmodified commercial television signals for the purpose of location and tracking of mobile assets. The technology is entirely passive: nothing is added to the broadcast signal, nor is picture demodulated. Television transmitters are highly correlated with urban population centers, making them ideal for position location in environments precisely where GPS is most challenged. Further, TV spectrum

[1] http://www.ostp.gov/html/FactSheetSPACE-BASEDPOSITIONINGNAVIGATIONTIMING.pdf
[2] http://www2.fbo.gov/EPSData/ODA/Synopses/4965/BAA05%2D32/PIPBAA0532May92005%2Epdf

can also be used to send precise clock information to mobile or static assets. As such, TV-positioning is a highly promising potential complement to GPS. The figure below shows some of the fundamental advantages of utilizing commercial TV signals for position location in urban areas or indoors, as compared to GPS.

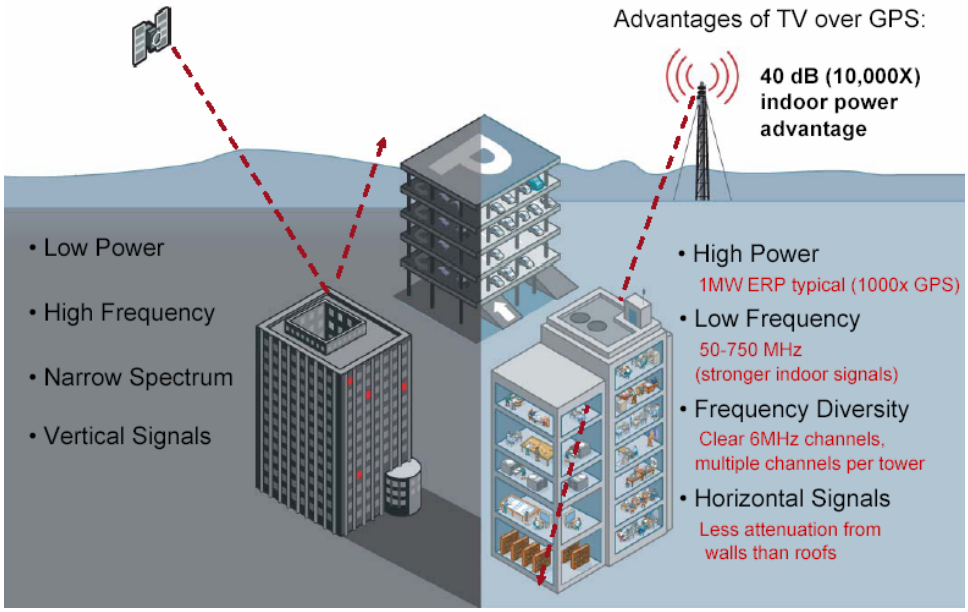


Figure 1: Advantages of using TV for position location in indoor environments.

In sum, commercial TV signals have several fundamental attributes that make them highly complementary to GPS signals. The table below shows frequency bands for TV and for GPS.

Band	**Frequency**
Low VHF	50-86 MHz
High VHF	170-212 MHz
UHF	450-750 MHz
GPS	1.575 GHz
L-band (planned for TV broadcasts to mobile handsets)	1.675 GHz

Table 1: TV & GPS Frequency Bands

Frequencies are both low and diverse, and the signals are wide in bandwidth (6 MHz in the United States) making TV signals ideal for indoor reception, and for mitigation of signal multipath.

Attribute	Benefit
Low frequency	Low frequency enables signal to punch through walls easily
Frequency diversity	Multiple channels per TV transmitter; advantageous for mitigation of multipath
Power	Megawatt power in some cases; designed precisely for indoor receivability
Bandwidth	The ability to mitigate signal multipath is directly correlated with bandwidth; TV's wide bandwidth is highly advantageous

Table 2: Inherent Benefits of TV Signals for Use in Positioning Indoors or in Urban Areas

TV-Positioning System Architecture

The following figure shows the current system architecture for TV-positioning.

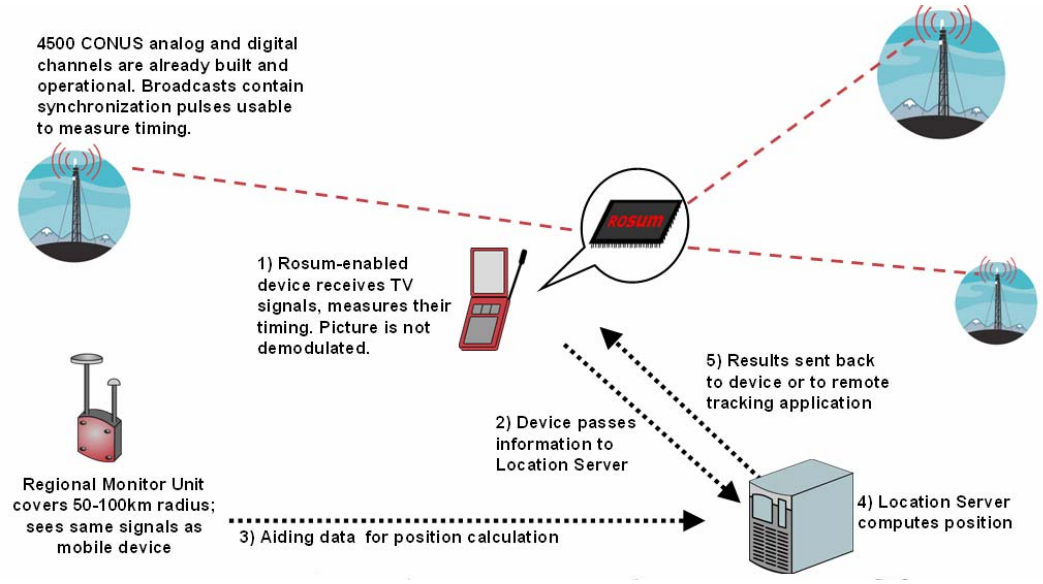


Figure 2: TV-positioning current system architecture.

The system comprises three components: (1) the mobile asset, which contains a TV tuner and Rosum processor; (2) a Location Server (RLS); and (3) a Regional Monitor Unit (RMU), which provides a reference time used to provide aiding data to the server. TV channels clocks are not synchronized to a common reference, which is why the RMU is utilized to provide a common clock. Two to three RMUs can cover a metropolitan service area. For example, two are used to cover the greater Washington DC area from Alexandria to Dulles to lower Baltimore.

Currently commercial cellular networks are typically used for communication between device and server. This is mainly due to their broad availability and relative affordability. To date, GPRS, CDMA, SMS, 802.11x and Ethernet connectivity have been used. However, Rosum TV-positioning is backhaul-agnostic. In applications where higher quality of service is required, private networks may be used; in more ad hoc applications, ad hoc networks may also be used.

Future System Architecture

The RMU cited above is required since TV clocks are unsynchronized. Later in this paper, the benefits of synchronizing TV clocks or a subset of them are described.

Broadcast TV Infrastructure

TV transmitters are well-correlated with population density. The following figure shows TV transmitter locations on the northeast seaboard of the United States.

Figure 3: TV transmitters on the northeast seaboard.

Transmitters are highly correlated with urban centers such as Washington DC, Boston, or New York City. Conversely, they are less correlated with rural areas. However, terrestrial TV signals are nearly ubiquitous in terms of population reach, which makes them a promising medium with which clock could be disseminated in a GPS-denied environment. Broadcast television is already used for the Emergency Alert System; this paper proposes that they could also be used as a Homeland Emergency Positioning and Clock Transmission Network.

In the past year, two similar efforts have taken place. The FCC has solicited comment and adopted an Order on how to expand the reach of the Emergency Alert System (EAS; formerly the Emergency Broadcast System) by incorporating new forms of digital broadcast media[3]. FEMA, with the Association of Public Television Stations (APTS), has conducted experiments on using TV spectrum to send geospecific data to enabled receivers as a pilot enhancement to the EAS.[4]

[3] http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-191A1.doc
[4] http://www.fema.gov/news/newsrelease_print.fema?id=14924

Both of these efforts take advantage of the pervasive reach of television broadcasts. In sum, broadcast television presents a compelling resource that can be leveraged in the interest of homeland security. Examples of how to optimize TV signals for positioning purposes are provided in a following section.

Self-Deployable Beacons for Positioning and Clock Transmission

Some environments, both domestic and overseas, have more austere or even diminished broadcast infrastructure. For those environments, and to enable more precise location and tracking in specific areas of interest both domestic and overseas, Rosum has developed a prototype self-deployable beacon system ("pseudo TV transmitters") that broadcasts "TV-like", optimized signals at key buildings or facilities of interest.

This system is particularly promising for environments in which infrastructure control and optimization is desired, or when conventional infrastructure is impaired. (TV transmitters are equipped with backup generators and often backup antennae are in the same location. Guidelines on TV transmitter operation during disaster scenarios are provided by the Media Security & Reliability Council.[5]) A concept diagram is shown in the figure below. First responders deploy beacons around a burning building to support real-time situational awareness.

Figure 5: Positioning of rescue personnel using self-deployable beacons.

The above example showed how beacons can be used for local-area positioning around one key building of interest. Beacons can also be used for wide-area "broadcast" positioning, much as TV signal is broadcast now. Potential future enhancements include developing a transceiver, in which the ground reference station itself is usable as an emitter or positioning beacon.

Using locally-arrayed beacons, Rosum has achieved accuracies of 3 meters in indoor testing in an suburban office building setting. Transmitters were placed outside of the building, with no indoor repeaters or access points.

[5] http://www.fcc.gov/MSRC/

In March 2005, the FCC adopted an Order (FCC 05-57) to facilitate efficient use of radio spectrum by cognitive or "smart" software-defined radios (SDRs)[6]. This Order described multiple methods of accessing empty spectrum or secondary use of licensed spectrum. "Smart", location-aware beacons represent one such use.

Wider bandwidths

In the United States, the Rosum beacon system uses 6 MHz bandwidth signals in the UHF band, where commercial TV is typically found. This is to take advantage of broadcast "white space" – local areas where a given channel may be empty. In austere environments where there area fewer ambient signals, wider bandwidths could be used. Similar methods could be applied during disaster settings in the homeland. The ability to mitigate multipath, or reflected signals that may cloak the true line-of-sight signal, is directly correlated with signal bandwidth.

Improving Broadcast Infrastructure in Homeland

At present TV transmitters are not synchronized to a common reference time. This latter phenomenon necessitates the ground reference station used in the current Rosum positioning architecture.

Future System Architecture

Stabilizing transmitter clocks, by synchronizing them to a GPS receiver or Rubidium clock, would improve channel clocks to a point where reference station use could be minimized, enabling on-device positioning. Greater accuracies could also be realized. Using ambient, unimproved signal in open line-of-sight environments, the Rosum system has realized accuracies of 5 meters averaged across prolonged testing. In indoor environments characterized by signal multipath and where GPS is unavailable, such as Washington Union Station or San Francisco's Financial District, positioning errors are typically 10s of meters averaged across prolonged testing[7]. Stabilizing signal clocks would enable improved positioning accuracies, and would also enable signals to be used as metro-wide positioning beacons, or for clock dissemination to time-sensitive assets.

In a second scenario, aiding data for positioning could be pushed out over the air, as is done with some differential GPS services today. This would also enable on-device positioning. One comparable is the RF watermark (A/110) standard recently instituted by the ATSC[8], which is used as a transmitter identification in distributed networks.

An Inexpensive Solution

The per-channel cost of stabilizing TV clocks would be roughly $3,000 if GPS receivers were used to stabilize both frequency and clock. If robustness to GPS' jamming is a concern, then Rubidium or cesium clocks may be used, at roughly $5,000 per channel. Adding Rubidium clocks to every

[6] http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-57A1.pdf

[7] Rosum applies the FCC Wireless E9-1-1 standards for handsets as one measure of accuracy. Circular error probability is applied. Tests are of sufficient duration to obtain statistical viability.

[8] http://www.atsc.org/standards/a_110a.pdf

CONUS TV channel would cost roughly $22.5 million. By comparison, $400 million is spent each year in GPS upkeep alone.

Individual TV transmitter towers often have multiple channels, if not on the same tower, then at least on the same hill. As such, channels may be grouped into "clusters". Stabilizing just a few channels per cluster would enable signal redundancy and frequency diversity, both of which are key to reliable positioning. At three channels per cluster, this would cost between $9,000 and $15,000 for the hardware. At five clusters per metropolitan service area, this comes to approximately $75,000. The following figure shows clusters for the greater Washington-Baltimore area. Signals from Baltimore are usable within Washington for positioning. Transmitters are represented in purple. For positioning purposes, weaker signals than those required to demodulate picture can be used. Signals are useful at distances of 30-100km, depending on terrain and power.

Figure 6: Transmitter clusters in the Washington-Baltimore metropolitan service area. Circles are of radius 25km and 50km.

Nationwide transmitters are shown in the following figure. Latitude and longitude are shown in the x- and y-axes. Approximately 4500 channels are broadcast from 2800 transmitters.[9]

[9] Information on total channels and the DTV rollout are available at:
http://www.nab.org/Newsroom/Issues/digitaltv/DTVstations.asp
http://www.fcc.gov/mb/video/files/dtvsum.html
The FCC TV Query Database can be found at http://www.fcc.gov/mb/audio/tvq.html

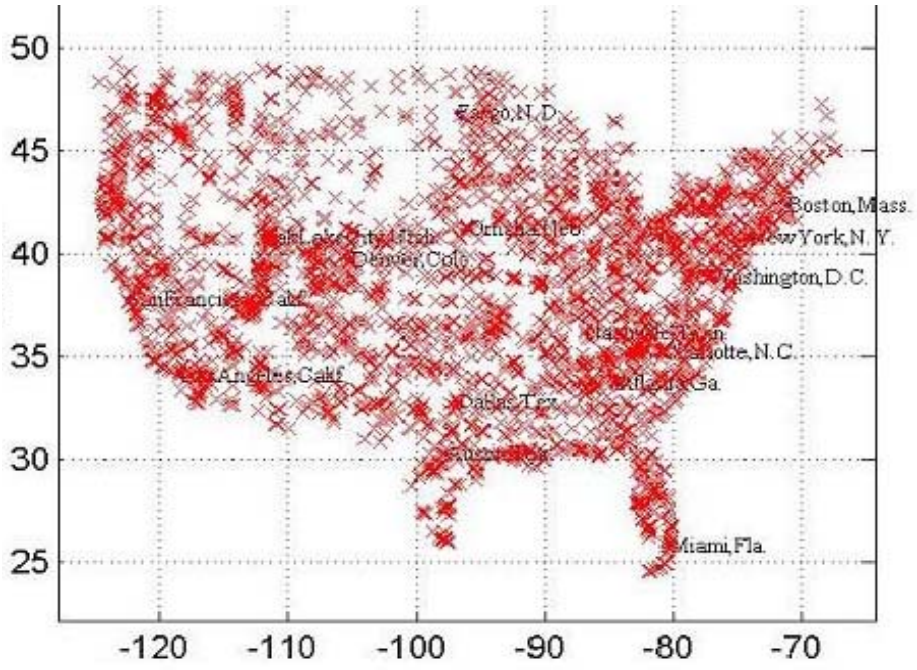


Figure 7: CONUS TV transmitters.

Homeland Security Applications

TV-positioning presents a promising way to extend real-time situational awareness of high-value assets for homeland security. A list of representative positioning applications in the homeland is provided below.

First Responders

9/11 demonstrated in painful detail that our first responders are not supported by robust, real-time situational awareness. As a result firemen ran into the towers blind, with no knowledge of who was in the buildings and where they were. This led to unnecessary and avoidable loss of life. Real-time situational awareness would have enabled prompt and precise decision-making at command centers on where resources should best be deployed. Even in non-disaster environments, real-time situational awareness would eliminate the need for "location chatter", enabling responders to focus on the task at hand, rather than on communicating their current location. These examples apply to military personnel as well.

HSARPA and the Office of Naval Research have solicited proposals for real-time, robust positioning systems for first responders. The Naval Research Laboratory has conducted a trade study on the current landscape of potential technological options for the support of first responders.

Asset Tracking

Over time, asset tracking customers have pushed for the ability to track the individual asset, not just the truck. In the homeland security field, this is particularly desired for tracking of highly sensitive

assets such as hazardous material or waste. At present, commercial users are able to track long-haul truck through satellite tracking; metro fleets with line-of-sight to the sky through GPS-based tracking; and individual pallets in the warehouse through choke point technologies such as RFID. However, tracking of the asset or pallet inside of the vehicle or transport while it is on the move still is not possible, nor is tracking possible once it has left the truck into an indoor or urban environment. A system that does not require pre-installed infrastructure and can sustain real-time positioning in nomadic situations is desired.

Offender Monitoring
Numerous states have either passed or are considering legislation in support of GPS-based tracking of offenders on parole. State budgets are constrained, and tracking an offender is dramatically cheaper than housing him. However, GPS-based tracking systems are limited in their ability to maintain real-time awareness of the offender's whereabouts. Due to these dark spots in coverage, spoofing or tampering incidents would not necessarily be recognized when they occur. A real-time robust solution is desired. This issue also applies to patient tracking.

Clock
In addition, Rubidium-stabilized TV channels could be used to send time and frequency to time-sensitive assets, such as encrypted networks.

Testing
Using broadcast TV signals for positioning enables real-time positioning of sensitive assets even in challenging indoor environments. Positioning using on-air, ambient TV signals has been tested and proven in tough indoor environments such as Washington DC's Union Station; Manhattan, New York; and San Francisco's Financial District. Representative results are attached to this paper.
Test were exclusively conducted indoors in environments where GPS was unavailable.

Conclusions
TV-positioning, both through ambient signal and self-deployed signal, represents a promising new way to deliver reliable, real-time location capability where it has not been possible to date. The broadcast infrastructure is already built and in position, and is used for applications that require high quality of service, such as the Emergency Alert System. Further, the broadcast infrastructure is both distributed and equipped with backup transmitters and power, making it highly robust to jamming and disaster. The FCC, in the wake of 9/11, created the Media Security & Reliability Council to make sure that protocols in times of disaster are maintained consistently across broadcasters. Augmenting the broadcast system through stabilizing channel clocks would enable even more accurate positioning, as well as autonomous positioning on the device, and would enable TV broadcasts to be used as a reliable clock source. As a terrestrial signal-based system, TV-positioning has a vital role to play as a complement to satellite systems such as GPS.

**

Further information on TV-positioning is available at www.rosum.com.
Rosum contact: Jon Metzler, Director of Business Development. jmetzler@rosum.com.

U.S. SPACE-BASED POSITIONING, NAVIGATION, AND TIMING POLICY

December 15, 2004

FACT SHEET

The President authorized a new national policy on December 8, 2004 that establishes guidance and implementation actions for space-based positioning, navigation, and timing programs, augmentations, and activities for U.S. national and homeland security, civil, scientific, and commercial purposes. This policy supersedes Presidential Decision Directive/National Science and Technology Council-6, U.S. Global Positioning System Policy, dated March 28, 1996.

I. Scope and Definitions

This policy provides guidance for: (1) development, acquisition, operation, sustainment, and modernization of the Global Positioning System and U.S.-developed, owned and/or operated systems used to augment or otherwise improve the Global Positioning System and/or other space-based positioning, navigation, and timing signals; (2) development, deployment, sustainment, and modernization of capabilities to protect U.S. and allied access to and use of the Global Positioning System for national, homeland, and economic security, and to deny adversaries access to any space-based positioning, navigation, and timing services; and (3) foreign access to the Global Positioning System and United States Government augmentations, and international cooperation with foreign space-based positioning, navigation, and timing services, including augmentations.

For purposes of this document:

- "Interoperable" refers to the ability of civil U.S. and foreign space-based positioning, navigation, and timing services to be used together to provide better capabilities at the user level than would be achieved by relying solely on one service or signal;

- "Compatible" refers to the ability of U.S. and foreign space-based positioning, navigation, and timing services to be used separately or together without interfering with each individual service or signal, and without adversely affecting navigation warfare; and

- "Augmentation" refers to space and/or ground-based systems that provide users of space-based positioning, navigation, and timing signals with additional information that enables

users to obtain enhanced performance when compared to the un-augmented space-based signals alone. These improvements include better accuracy, availability, integrity, and reliability, with independent integrity monitoring and alerting capabilities for critical applications.

II. Background

Over the past decade, the Global Positioning System has grown into a global utility whose multi-use services are integral to U.S. national security, economic growth, transportation safety, and homeland security, and are an essential element of the worldwide economic infrastructure. In the year 2000, the United States recognized the increasing importance of the Global Positioning System to civil and commercial users by discontinuing the deliberate degradation of accuracy for non-military signals, known as Selective Availability. Since that time, commercial and civil applications of the Global Positioning System have continued to multiply and their importance has increased significantly. Services dependent on Global Positioning System information are now an engine for economic growth, enhancing economic development, and improving safety of life, and the system is a key component of multiple sectors of U.S. critical infrastructure.

While the growth in civil and commercial applications continues, the positioning, navigation, and timing information provided by the Global Positioning System remains critical to U.S. national security, and its applications are integrated into virtually every facet of U.S. military operations. United States and allied military forces will continue to rely on the Global Positioning System military services for positioning, navigation, and timing services.

The continuing growth of services based on the Global Positioning System presents opportunities, risks, and threats to U.S. national, homeland, and economic security. The widespread and growing dependence on the Global Positioning System of military, civil, and commercial systems and infrastructures has made many of these systems inherently vulnerable to an unexpected interruption in positioning, navigation, and/or timing services. In addition, whether designed for military capabilities or not, all positioning, navigation, and timing signals from space and their augmentations provide inherent capabilities that can be used by adversaries, including enemy military forces and terrorist groups. Finally, emerging foreign space-based positioning, navigation, and timing services could enhance or undermine the future utility of the Global Positioning System.

The United States must continue to improve and maintain the Global Positioning System, augmentations, and backup capabilities to meet growing national, homeland, and economic security requirements, for civil requirements, and to meet commercial and scientific demands. In parallel, we must continue to improve capabilities to deny adversary access to all space-based positioning, navigation, and timing services, particularly including services that are openly available and can be readily used by adversaries and/or terrorists to threaten the security of the United States. In addition, the diverse requirements for and multiple applications of space-based positioning, navigation, and timing services require stable yet adaptable policies and management mechanisms. The existing management mechanisms for the Global Positioning System and its augmentations must be modified to accommodate a multi-use approach to program planning, resource allocation, system development, and operations. Therefore, the United States Government must improve the policy and management framework governing the

Global Positioning System and its augmentations to support their continued ability to meet increasing and varied domestic and global requirements.

III. Goals and Objectives

The fundamental goal of this policy is to ensure that the United States maintains space-based positioning, navigation, and timing services, augmentation, back-up, and service denial capabilities that: (1) provide uninterrupted availability of positioning, navigation, and timing services; (2) meet growing national, homeland, economic security, and civil requirements, and scientific and commercial demands; (3) remain the pre-eminent military space-based positioning, navigation, and timing service; (4) continue to provide civil services that exceed or are competitive with foreign civil space-based positioning, navigation, and timing services and augmentation systems; (5) remain essential components of internationally accepted positioning, navigation, and timing services; and (6) promote U.S. technological leadership in applications involving space-based positioning, navigation, and timing services. To achieve this goal, the United States Government shall:

- Provide uninterrupted access to U.S. space-based global, precise positioning, navigation, and timing services for U.S. and allied national security systems and capabilities through the Global Positioning System, without being dependent on foreign positioning, navigation, and timing services;

- Provide on a continuous, worldwide basis civil space-based, positioning, navigation, and timing services free of direct user fees for civil, commercial, and scientific uses, and for homeland security through the Global Positioning System and its augmentations, and provide open, free access to information necessary to develop and build equipment to use these services;

- Improve capabilities to deny hostile use of any space-based positioning, navigation, and timing services, without unduly disrupting civil and commercial access to civil positioning, navigation, and timing services outside an area of military operations, or for homeland security purposes;

- Improve the performance of space-based positioning, navigation, and timing services, including more robust resistance to interference for, and consistent with, U.S. and allied national security purposes, homeland security, and civil, commercial, and scientific users worldwide;

- Maintain the Global Positioning System as a component of multiple sectors of the U.S. Critical Infrastructure, consistent with Homeland Security Presidential Directive-7, Critical Infrastructure Identification, Prioritization, and Protection, dated December 17, 2003;

- Encourage foreign development of positioning, navigation, and timing services and systems based on the Global Positioning System. Seek to ensure that foreign space-based positioning, navigation, and timing systems are interoperable with the civil services of the Global Positioning System and its augmentations in order to benefit civil, commercial, and scientific users worldwide. At a minimum, seek to ensure that foreign systems are

compatible with the Global Positioning System and its augmentations and address mutual security concerns with foreign providers to prevent hostile use of space-based positioning, navigation, and timing services; and

- Promote the use of U.S. space-based positioning, navigation, and timing services and capabilities for applications at the Federal, State, and local level, to the maximum practical extent.

IV. Management of Space-Based Positioning, Navigation, and Timing Services

This policy establishes a permanent National Space-Based Positioning, Navigation, and Timing Executive Committee. The Executive Committee will be co-chaired by the Deputy Secretaries of the Department of Defense and the Department of Transportation or by their designated representatives. Its members will include representatives at the equivalent level from the Departments of State, Commerce, and Homeland Security, the Joint Chiefs of Staff, the National Aeronautics and Space Administration, and from other Departments and Agencies as required. Components of the Executive Office of the President, including the Office of Management and Budget, the National Security Council staff, the Homeland Security Council staff, the Office of Science and Technology Policy, and the National Economic Council staff, shall participate as observers to the Executive Committee. The Chairman of the Federal Communications Commission shall be invited to participate on the Executive Committee as a Liaison. The Executive Committee shall meet at least twice each year. The Secretaries of Defense and Transportation shall develop the procedures by which the Committee shall operate.

The Executive Committee shall make recommendations to its member Departments and Agencies, and to the President through the representatives of the Executive Office of the President. In addition, the Executive Committee will advise and coordinate with and among the Departments and Agencies responsible for the strategic decisions regarding policies, architectures, requirements, and resource allocation for maintaining and improving U.S. space-based positioning, navigation, and timing infrastructures, including the Global Positioning System, its augmentations, security for these services, and relationships with foreign positioning, navigation, and timing services. Specifically, the Executive Committee shall:

- Ensure that national security, homeland security, and civil requirements receive full and appropriate consideration in the decision-making process and facilitate the integration and deconfliction of these requirements for space-based positioning, navigation, and timing capabilities, as required;

- Coordinate individual Departments' and Agencies' positioning, navigation, and timing program plans, requirements, budgets, and policies, and assess the adequacy of funding and schedules to meet validated requirements in a timely manner;

- Ensure that the utility of civil services exceeds, or is at least equivalent to, those routinely provided by foreign space-based positioning, navigation, and timing services;

- Promote plans to modernize the U.S. space-based positioning, navigation, and timing infrastructure, including: (1) development, deployment, and operation of new and/or

improved national security and public safety services when required and to the maximum practical extent; and (2) determining the apportionment of requirements between the Global Positioning System and its augmentations, including consideration of user equipment;

- Review proposals and provide recommendations to the Departments and Agencies for international cooperation, as well as spectrum management and protection issues; and

- Establish a space-based Positioning, Navigation, and Timing Advisory Board. The board shall be comprised of experts from outside the United States Government, and shall be chartered as a Federal Advisory Committee.

The Executive Committee shall establish the National Space-Based Positioning, Navigation, and Timing Coordination Office. This office shall provide the staff functions for the Executive Committee. It shall be led by a full-time Director chosen by, and reporting to the Executive Committee, and shall include a cadre of full-time staff provided by Departments and Agencies represented on the Executive Committee. The Executive Committee shall determine the resources for the National Space-Based Positioning, Navigation, and Timing Coordination Office, including funding, location, staffing, and composition, consistent with the direction of this policy.

The National Space-Based Positioning, Navigation, and Timing Coordination Office shall serve as the Secretariat for the Executive Committee and shall perform those functions delegated by the Executive Committee. Departments and Agencies shall provide appropriate information to the National Space-Based Positioning, Navigation, and Timing Coordination Office to ensure interagency transparency about positioning, navigation, and timing programs, policies, budgets, and activities that might affect mutual interests or interagency dependencies. The Interagency Global Positioning System Executive Board is hereby disestablished, and the Executive Committee or the National Space-Based Positioning, Navigation, and Timing Coordination Office, as appropriate, shall assume its functions as defined in the Positioning, Navigation, and Timing Executive Committee Charter, consistent with the direction provided in this policy.

The Executive Committee shall advise and coordinate the interdepartmental resource allocation for the Global Positioning System and it augmentations on an annual basis. The Secretary of Defense shall have primary responsibility for providing resources for development, acquisition, operation, sustainment, and modernization of the Global Positioning System. The Secretary of Transportation shall provide resources to the Secretary of Defense for assessment, development, acquisition, implementation, operation, and sustainment of additional designated Global Positioning System civil capabilities beyond the second and third civil signals already contained in the current Global Positioning System program. Global Positioning System civil signal performance monitoring, augmentations, and other unique positioning, navigation, and timing capabilities will be funded by the agency or agencies requiring those services or capabilities, including out-year procurement and operations costs. Any new technical features proposed and funded by the civil agencies shall not degrade or displace existing or planned national security functions of the system. If the Executive Committee recommends that the availability of Global Positioning System capabilities should be accelerated, the Executive Committee will make recommendations regarding the resources required to accelerate those capabilities. Resource issues will be resolved during the regular budget process.

The details of the cost sharing between: (1) the Department of Defense and the Department of Transportation, for the Global Positioning System; and (2) Departments and Agencies sponsoring augmentations, and/or unique or accelerated capabilities, shall be outlined in a Five-Year National Space-Based Positioning, Navigation, and Timing Plan, consistent with the guidance provided in this policy.

V. Foreign Access to U.S. Space-based Positioning, Navigation, and Timing Capabilities

Any exports of U.S. positioning, navigation, and timing capabilities covered by the United States Munitions List or the Commerce Control List will continue to be licensed pursuant to the International Traffic in Arms Regulations or the Export Administration Regulations, as appropriate, and in accordance with all existing laws and regulations.

As a general guideline, export of civil or other non-United States Munitions List space-based positioning, navigation and timing capabilities that are currently available or are planned to be available in the global marketplace will continue to be considered favorably. Exports of sensitive or advanced positioning, navigation, and timing information, systems, technologies, and components will be considered on a case-by-case basis in accordance with existing laws and regulations, as well as relevant national security and foreign policy goals and considerations. In support of such reviews, the Secretary of State, in consultation with the Secretaries of Defense, Commerce, and Energy, the Administrator of the National Aeronautics and Space Administration, and the Director of Central Intelligence, shall modify and maintain the Sensitive Technology List directed in U.S. Commercial Remote Sensing Space Policy, dated April 25, 2003, including those technology items or areas deemed sensitive for positioning, navigation and timing applications. The Secretaries of State and Commerce shall use the list in the evaluation of requests for exports.

VI. Agency Roles and Responsibilities

Departments and Agencies shall allocate the resources required to fulfill the objectives of this policy. Nothing in this policy shall diminish the operational and budgetary authorities of the Departments and Agencies.

The Secretary of Defense shall:

- Have responsibility for development, acquisition, operation, security, and continued modernization of the Global Positioning System, while facilitating appropriate civil and homeland security Department and Agency representation and participation in these activities, and any decisions that affect civil and homeland security equities;

- Develop, acquire, operate, realistically test, evaluate, and maintain navigation warfare capabilities and other capabilities required to:

    - Effectively utilize the Global Positioning System services in the event of adversary jamming or other interference;

    - Deny to adversaries position, navigation, and timing services from the Global Positioning System, its augmentations, and/or any other space-based position, navigation, and timing systems without unduly disrupting civil, commercial, and scientific uses of these services outside an area of military operations, or for homeland security purposes; and

    - Identify, locate and mitigate, in coordination with Departments and Agencies, as appropriate, any interference on a global basis that adversely affects use of the Global Positioning System for military operations;

- Ensure the earliest operational availability for modernized military and navigation warfare capabilities;

- Train, equip, test, and exercise U.S. military forces and national security capabilities in operationally realistic conditions that include denial of the Global Positioning System. In cooperation with the Secretaries of Transportation and Homeland Security, and as appropriate, with the Secretary of State, develop guidelines that facilitate these activities and Navigation Warfare training, testing, demonstrations, and exercises without unduly disrupting or degrading homeland security and civil services and operations, either internationally or domestically;

- Promote use of Global Positioning System national security services to allied military forces to facilitate interoperability between U.S. and allied forces and capabilities, and to maintain their use as the pre-eminent military space-based positioning, navigation, and timing capability;

    - Consistent with the guidance in Section V of this policy, make Global Positioning System national security services, user equipment, information, and technology available for use by allied military forces; and

    - Work with allies to monitor access to national security services and user equipment, in order to limit the potential for adversaries to use these capabilities against U.S. and allied military forces;

- Maintain the commitment to discontinue the use of the feature known as Selective Availability designed to degrade globally the Standard Positioning Service of the Global Positioning System;

- Facilitate access to appropriate levels of national security services and user equipment at the Federal level to meet critical requirements for emergency response and other homeland security purposes, and, on an exceptional basis, for civil purposes, including state or local emergency response;

- Develop improved, dedicated national security positioning, navigation, and timing capabilities, including but not limited to more diverse, flexible, and capable signals and services;

- Maintain lead responsibility for negotiating with foreign defense organizations any cooperation regarding access to or information about Global Positioning System military services; and

- In cooperation with other Departments and Agencies, assess the utility and feasibility of hosting secondary payloads on Global Positioning System satellites, including, but not limited to those intended to enhance global search and rescue capabilities for all users. No secondary payload may adversely affect the performance, schedule, or cost of the Global Positioning System, its signals or services. Resources required for the assessment, development, acquisition, integration, and operation of secondary payloads shall be the responsibility of the sponsoring agency or agencies.

The Secretary of Transportation shall:

- Have lead responsibility for the development of requirements for civil applications from all United States Government civil Departments and Agencies;

- Ensure, in cooperation with the Secretary of Defense and the Secretary of Homeland Security, the performance monitoring of U.S. civil space-based positioning, navigation, and timing services;

- Consistent with the guidance in Section V of this policy, and in coordination with the Secretary of Commerce and the Secretary of State, facilitate: (1) foreign development of civil positioning, navigation, and timing services and systems based on the Global Positioning System; and (2) international participation in the development of civil applications for U.S. space-based positioning, navigation, and timing services;

- Ensure, in coordination with the Secretary of Defense, that space-based positioning, navigation, and timing public safety services meet or exceed international performance standards, including but not limited to those used for these services in aviation and/or maritime applications;

- In cooperation with other Departments and Agencies, promote the use of U.S. civil space-based positioning, navigation, and timing services and capabilities for transportation safety;

- Represent the civil Departments and Agencies in the development, acquisition, management, and operations of the Global Positioning System;

- Develop, acquire, operate, and maintain Global Positioning System space or terrestrial augmentations for civil transportation applications;

- Ensure the earliest operational availability for modernized civil signals and services on the Global Positioning System and its augmentations, in coordination with the Secretary of Defense;

- In coordination with the Secretary of Homeland Security, develop, acquire, operate, and maintain backup position, navigation, and timing capabilities that can support critical

transportation, homeland security, and other critical civil and commercial infrastructure applications within the United States, in the event of a disruption of the Global Positioning System or other space-based positioning, navigation, and timing services, consistent with Homeland Security Presidential Directive-7, Critical Infrastructure Identification, Prioritization, and Protection, dated December 17, 2003; and

- In cooperation with the Secretary of Defense, assess and assist, as appropriate, in the international acceptance for using the military positioning, navigation, and timing services of the Global Positioning System for operations in civil airspace.

The Secretary of Commerce shall:

- Represent U.S. commercial interests with other Departments and Agencies in the requirements review of the Global Positioning System and related space-based augmentations;

- In coordination with the Secretaries of State, Defense, and Transportation and the National Aeronautics and Space Administration, seek to protect the radio frequency spectrum used by the Global Positioning System and its augmentations through appropriate domestic and international spectrum management and regulatory practices;

- In coordination with the Secretaries of Defense and Transportation, and the Administrator of the National Aeronautics and Space Administration, facilitate cooperation between the United States Government and U.S. industry as appropriate to identify mutually acceptable solutions that will preserve existing and evolving uses of space-based positioning, navigation, and timing services, while allowing for the development of other technologies and services that depend on use of the radio frequency spectrum;

- In cooperation with the Administrator of the National Aeronautics and Space Administration, develop and provide to the Secretary of Transportation requirements for use of the Global Positioning System and its augmentations to support civil space systems; and

- In cooperation with other Departments and Agencies, promote the use of U.S. civil space-based positioning, navigation, and timing services and capabilities for applications at the Federal, State, and local level, to the maximum practical extent.

The Secretary of State shall:

- In cooperation with the Secretary of Defense, the Secretary of Transportation, and other Departments and Agencies promote the use of civil aspects of the Global Positioning System and its augmentation services and standards with foreign governments and other international organizations;

- Take the lead for negotiating with foreign governments and international organizations regarding civil and, as appropriate and in coordination with the Secretary of Defense, military positioning, navigation, and timing matters, including but not limited to coordinating interagency review of:

- Instructions to U.S. delegations for bilateral and multilateral consultations relating to the planning, management, and use of the Global Positioning System and related augmentation systems; and

- International agreements with foreign governments and international organizations regarding the planning, operation, management, and/or use of the Global Positioning System and its augmentations; and

- Modify and maintain, in coordination with the Secretaries of Defense, Commerce, and Energy, the Director of Central Intelligence, and the Administrator of the National Aeronautics and Space Administration, the Sensitive Technology List created by U.S. Commercial Remote Sensing Space Policy, dated April 25, 2003. In particular, include sensitive technology items and/or information related to positioning, navigation, and timing applications.

The Secretary of Homeland Security shall:

- Identify space-based positioning, navigation, and timing requirements for homeland security purposes to the Secretary of Transportation, and coordinate the use of positioning, navigation, and timing capabilities and backup systems for homeland security purposes by Federal, State, and local governments and authorities;

- In coordination with the Secretary of Transportation, and with other Departments and Agencies, promote the use of the Global Positioning System positioning and timing standards for use by Federal agencies, and by State and local authorities responsible for public safety and emergency response;

- In coordination with the Secretary of Defense, and in cooperation with the Secretaries of Transportation and Commerce, ensure:

    - Mechanisms are in place to identify, understand, and disseminate timely information regarding threats associated with the potential hostile use of space-based positioning, navigation, and timing services within the United States; and

    - Procedures are developed, implemented, and routinely exercised to request assistance from the Secretary of Defense should it become necessary to deny hostile use of space-based position, navigation and timing services within the United States;

- In coordination with the Secretaries of Defense, Transportation, and Commerce, develop and maintain capabilities, procedures, and techniques, and routinely exercise civil contingency responses to ensure continuity of operations in the event that access to the Global Positioning System is disrupted or denied;

- In coordination with the Secretaries of Transportation and Defense, and in cooperation with other Departments and Agencies, coordinate the use of existing and planned Federal capabilities to identify, locate, and attribute any interference within the United States that

adversely affects use of the Global Positioning System and its augmentations for homeland security, civil, commercial, and scientific purposes; and

- In coordination with the Secretaries of Transportation and Defense, and the Director of Central Intelligence, and in cooperation with other Departments and Agencies: (1) develop a central repository and database for reports of domestic and international interference to the civil services of the Global Positioning System and its augmentations for homeland security, civil, commercial, and scientific purposes; and (2) notify promptly the Administrator, National Telecommunications and Information Administration, the Chairman of the Federal Communications Commission, the Secretary of Defense, the Director of Central Intelligence, and other Departments and Agencies in cases of domestic or international interference with space-based positioning, navigation, and timing services to enable appropriate investigation, notification, and/or enforcement action.

The Administrator of the National Aeronautics and Space Administration, in cooperation with the Secretary of Commerce, shall develop and provide to the Secretary of Transportation requirements for the use of the Global Positioning System and its augmentations to support civil space systems.

The Director of Central Intelligence shall identify, monitor, and assess the development of foreign threats to the use of the Global Positioning System positioning, navigation, and timing architectures and related services; provide information to assist the Secretary of Defense in development of countermeasures;

Departments and Agencies detecting interference, or receiving reports of domestic or international interference adversely affecting the performance of U.S. space-based positioning, navigation, and timing services shall provide timely reports to the Secretary of Homeland Security, the Secretary of Defense, and the Director of Central Intelligence**.** Upon notification by the Secretary of Homeland Security:

- The Secretary of Commerce, in cooperation with other Departments and Agencies, and with the Chairman of the Federal Communications Commission shall take appropriate and legally permissible actions required to mitigate interference to U.S. space-based positioning, navigation, and timing services within the United States; and

- The Secretary of State shall, as appropriate, notify and/or coordinate the notification of foreign governments and international organizations in cases of interference with U.S. space-based positioning, navigation, and timing services caused by foreign government or commercial activities.

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ROSUM CORPORATION

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Corporate Fact Sheet

Experienced Team

Chairman	- Dr. Jim Spilker Jr.
CEO	- Skip Speaks
CTO	- Dr Matt Rabinowitz
CFO	- Matthew Lewis
V.P. Engineering	- George Flammer
VP Product Development	- Dimitri Rubin
Chief Scientist	- Dr. Jim Omura

Board of Directors

- Dr. Jim Spilker Jr., Co-architect of GPS, founder & CEO of Stanford Telecom
- Skip Speaks, former CEO, Kyocera Wireless, Triton Communications
- Paul Baran, co-founder: Stratacom, Metricom, and COM21; invented packet switched data
- James Gibbons, Board Member Cisco & former Dean of Engineering at Stanford University
- Lara Druyan, Allegis Capital
- Bill Tai, Charles River Ventures

Technical Board of Advisors

- Dr. Matthew Rabinowitz, founder Rosum, co-founder of Panopticon
- Jim Omura, founder of Cylink, specialist in DTV
- Dr. Brad Parkinson, head of Joint Program Office that constructed GPS, Professor at Stanford University
- Jerry Whitaker, leading expert in Video and Television Engineering
- F. Craig Farrill, former CTO of Vodafone, co-founder of inOvate
- Perry LaForge, founder and director of CDMA Development Group, co-founder innovate
- Per Enge, Director, Stanford GPS Laboratory
- Marco Thompson, founder, San Diego Telecom Council

Key Application Segments

- Asset Tracking & Recovery
- Government / Public Safety
- VoIP 9-1-1
- Location-based Services

Investors

- Charles River Ventures
- Allegis Capital
- Motorola Ventures
- Steamboat Ventures
- KTB Ventures
- In-Q-Tel
- Other development partners

Business Summary

Founded in 2000, Rosum is the first and only company to leverage the commercial broadcast TV infrastructure for positioning of mobile assets. The Rosum Positioning Technology (RPT) delivers seamless indoor and outdoor coverage and is particularly effective in urban and indoor areas, where traditional location systems have difficulty maintaining reliability, accuracy, and cost-effectiveness.

Rosum is engaged in the design and marketing of digital chips, servers and infrastructure products based on this technology. Rosum has established partnerships with leading companies in the public safety, asset tracking and telephony sectors. Rosum is also the first to combine TV and GPS-based positioning for true hybrid positioning based on the combined technologies. Rosum is currently supporting product trials for select partners in the government and law enforcement sectors.

Why Use TV Signals for Positioning?

Traditional positioning systems are satellite-based and were designed for outdoor applications. However, they have limitations indoors, in obstructed areas or difficult urban environments, where satellite signals attenuate and/or fail. TV signals are plentiful, powerful, low and diverse in frequency, and easily penetrate walls, automobiles, and city buildings, making them optimal for urban-area and indoor positioning applications. In sum, Rosum transforms the commercial TV infrastructure into a high-power, multi-frequency terrestrial GPS. Further, new broadcast networks, such as DVB-H, MediaFlo, and 1-segment ISDB are creating new signals, and a new platform of devices capable of viewing mobile TV. In sum, TV signals are growing broader and more prevalent.

Applications

Mobile assets, from devices to people, are nomadic and unpredictable in their movement. The ability to track these assets to date has been limited in the technologies themselves, which either diminish in performance in urban areas, or require extensive pre-installed infrastructure. Rosum delivers robust, accurate indoor/outdoor coverage with a minimum of infrastructure, making it the best possible solution for wide-area location applications, such as asset tracking, emergency services, and location services to mobile handsets, such as customized programming and advertising.

In addition, TV spectrum represents a fully-operational complement to or substitute for the GPS should it be compromised. President Bush, in a December 2004 Presidential Decision Directive, mandated the search for terrestrial complements to the GPS.

Product Development Opportunities

For further information on product trials or development opportunities, please contact *info@rosum.com* or *jmetzler@rosum.com*.

Summary of Benefits

- ***Robust and reliable indoors and in urban areas***
- ***Low cost device***
- ***Low infrastructure requirements***
- ***Accurate, available positioning***
- ***Consistently fast time to first fix***

Rosum Corporation Selected As World Economic Forum 2006 Technology Pioneer

Mountain View, CA – December 5, 2005 -- Rosum Corporation, a leading location-technology company, today announced its selection as a 2006 Technology Pioneer by the World Economic Forum. Technology Pioneers are companies that have been identified as developing and implementing innovative technologies with transformational societal and economic impact. Rosum is one of 36 companies across the globe selected for this prestigious honor.

"The creative innovations produced by our Technology Pioneers hold the promise of significantly affecting the way business and society operate", said Peter Torreele, Managing Director of the World Economic Forum. "As a global knowledge hub, we see the Technology Pioneer community as key contributors to this dialogue and to the mission of the World Economic Forum."

"We are honored to be recognized as a Technology Pioneer by the World Economic Forum," said Skip Speaks, CEO of Rosum Corporation. "This selection validates the potential impact of our pioneering technology. Rosum's technology will help our customers serve the public good, first in the public safety realm, such as by facilitating the work of first responders and tracking high-value or high-risk assets in urban and indoor environs where cost-effective and reliable tracking has not been feasible to date. On a larger scale, the Global Positioning System's vulnerabilities to both natural and man-made interference are well-established. Our technology augments the GPS in areas where its performance is challenged."

Each year, members, constituents and collaborators of the World Economic Forum nominate Technology Pioneers. Selection criteria include:

- **Innovation**. The technology must be innovative, not more than two years old, and the company should invest significantly in R&D.
- **Potential Impact**. The technology must have the potential to have a substantial long-term impact on business and society in the future.

- **Growth and Sustainability**. The company should have all the signs of a long-term market leader and should have well-formulated plans for future development and growth.
- **Proof of Concept.** The company must have a product on the market or have proven practical applications of the technology. Companies in "stealth" mode and companies with untested ideas or models will not qualify.
- **Leadership**. The company must have visionary leadership that plays a critical role in driving the company towards reaching its goals.

About World Economic Forum

The World Economic Forum (www.weforum.org), based in Geneva, Switzerland, is an independent organization committed to improving the state of the world. Funded by the contributions of 1,000 of the world's foremost corporations, the Forum acts in the spirit of entrepreneurship in the global public interest to further economic growth and social progress. The Forum serves its members and society by creating partnerships between and among business, political, intellectual and other leaders of society to define, discuss and advance key issues on the global agenda. Incorporated in 1971 as a foundation, the World Economic Forum is impartial and not-for-profit, and is tied to no political, partisan or national interests. In 1995 the Forum was awarded NGO consultative status with the Economic and Social Council of the United Nations.

About Rosum

Rosum is the first and only company to use unmodified broadcast TV signals for position location of mobile assets. The Rosum solution is uniquely suited to tracking of mobile devices in urban areas and indoors, where GPS and assisted GPS solutions often fail. Rosum's leadership is composed of industry leaders from the GPS, cellular and television worlds, and the company is venture-backed by leading investors including Charles River Ventures, Allegis Capital, and Motorola Inc. Partners include Trimble Navigation, the leading GPS company, and In-Q-Tel, the CIA's venture investment arm. Rosum's founding team includes the original architects of the GPS constellation. More information is available at www.rosum.com.

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